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NATURAL WOOD FINISHES FOR EXTERIORS OF HOUSES[1]

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Natural finishes for wood siding on the exteriors of houses have become increasingly popular during the past 15 years. Woods that have a rich brown or red color of their own, such as redwood and western redcedar, lend themselves particularly well to natural finish, though woods of paler color, such as cypress, pine, knotty pine, and Douglas-fir are sometimes finished in that way. Those who have learned to use suitable materials for a natural finish and to apply and maintain them correctly have usually found them pleasing and satisfactory. On the other hand, some who have tried natural finishes without first learning what they require have been disappointed and have changed back to the older practice of hiding the wood under a coating of house paint.

The first thing to learn about natural finishes is that they are much less durable and therefore must be renewed much more frequently than coatings of house paint. House paint should go at least 4 years before needing renewal but natural finishes nearly always need renewal at least once a year. On parts of a house that are fully exposed to sunshine and rain natural finish usually needs renewal every 6 months until it has been done three or four times, after which the intervals may be somewhat longer, though seldom more than 12 months. On more sheltered parts of the house yearly renewal may suffice and in deep shade the intervals may be even longer.

As a rule the lowest courses of siding on the south side of the house are most severely exposed and need most frequent renewal of natural finish whereas the highest courses of siding and the overhang under the eaves of the north side are the most sheltered and can go longest between renewals. Trees or neighboring houses, however, may shift the locations of greatest and least exposure to other parts of the house.

Need for renewal of finish becomes evident when the luster or glossiness originally imparted to the wood by the finish fades to the dullness of unfinished wood. Another test is to splash water on the surface to see whether the water rolls off quickly in droplets or spreads on the wood and is soon absorbed. In the latter case fresh application of finish is in order. Needed renewal of finish must not be delayed too long. For if

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[2] Maintained at Madison, Wis., in cooperation with the University of Wisconsin.

it is postponed unduly, the wood begins to acquire a gray color that turns still darker gray when more finishing eventually is done. To restore the desired color after serious grayness has developed, the surface must be scraped or sandpapered until the wood is bright again. If the wood is allowed to become roughened and cupped as well as grayed by weathering, the restoration of a smooth, bright surface becomes very laborious. For that reason the timely renewal of natural finish simply cannot be neglected. Similar neglect of coatings of house paint is less serious.

There is no way of keeping wood very long with exactly the color and nearly complete absence of gloss with which it comes from the lumber yard. A finish that could do so would enjoy a good market. But any protective finish that can be applied necessarily penetrates slightly into the wood, displaces air from wood cells, and seems to deepen the color of the wood even if the protective material has no color of its own. Moreover, by filling the pores in the wood, the protective material makes the surface smoother and therefore imparts at least a moderate degree of luster or glossiness. As time passes there is further change of color because sunlight gradually darkens the color of most woods by changing yellows and reds toward brown. Even the weakened sunlight that gets through windows eventually darkens interior woodwork. If in addition the protective finish itself darkens with age, as most of them do, still more change in color must be expected. Fortunately aged wood is still more attractive than freshly cut wood.

Natural finishes may be divided into three broad types, the oil finishes, the wood sealer finishes, and the varnish finishes. They differ in the composition of the material used, in the appropriate methods of application, in the resulting appearance, and in important characteristics of performance. The paint industry, however, has no such generally recognized classification of finishes; the trade names of commercial products do not necessarily indicate the type to which they belong. Thus a material may be sold as a "log cabin oil" and yet turn out to be either a sealer or a varnish. The user must judge from such information about the composition as may be given on the label and particularly from the way the product behaves when he starts to apply it.

OIL FINISH. The natural finish with the lowest degree of luster or gloss is the oil finish. It also darkens the color of the wood more than other natural finishes do because the oil penetrates farther into wood. Moreover, the oils are inclined to continue darkening with age more than most sealers or varnishes do. The darkening, however, can be largely corrected by incorporating a little pigment in the oil as is described farther on.

The simplest and oldest oil finish is ordinary linseed oil, either raw linseed oil or boiled linseed oil. Unless the work can be done in warm, dry weather it is best to use boiled oil or else to add about one-sixth of a pint of liquid paint drier to a gallon of raw oil. Most painters also like to add some volatile thinner to linseed oil, thinking that it makes the oil penetrate deeper. That is not the case but thinning the oil

helps to avoid leaving any excess oil on the surface. Turpentine, mineral spirits, or other thinner sold for mixing with paint may be used but do not add more than a half gallon of thinner to a gallon of oil.

The oil may be applied by brushing, spraying, or mopping. For new wood two good coats are needed. But it is most important to see that all of the oil sinks into the surface of the wood. If, after the second coat has been applied and has stood 20 to 30 minutes, there are any glossy places where excess oil stands on the surface, it should be wiped off before it has time to harden. Coatings of linseed oil are unsatisfactory not only because they are too glossy but because they are inclined to run or to wrinkle when they dry. In any event coatings of oil are too soft, tend to hold dirt, and become mildewed easily. In renewing the oil finish after it shows signs of wear one fresh application should suffice. Again, any excess not drawn into the wood should be wiped off. (Do not forget that oily rags are a fire hazard. Burn them promptly or keep them in a tightly closed metal container until they can be burned.)

Trade-brand products may be purchased at paint stores. They are often called log oils or log cabin oils because the natural finishes for exterior woodwork first became popular for summer cottages built of peeled logs. The commercial products are usually made of bodied linseed oil, tung oil, or other drying oils and thinners. Bodied oils have been heated or treated chemically to increase the viscosity greatly, after which a greater proportion of inexpensive thinner must be added to restore suitable viscosity for application. The bodied-oil finishes do not penetrate so deeply into wood as raw or boiled oil does and therefore do not darken the color of the wood so much. The product approaches the properties of a wood sealer more and more closely as the degree of bodying is increased.

The trade-brand oils should be applied and maintained just as has been described for the raw linseed oil finish. Since a bodied oil is more apt to leave an excess standing on the surface than raw oil is, special care should be taken to wipe off the excess before it becomes hardened.

The oil finishes give their best service in dry places where there never are any prolonged periods of dampness, such as southern Arizona. Where dampness may linger for some time the oils are subject to attack by molds, the fungi that grow on surfaces. On finishes the condition is usually called mildew. A dark, almost black discoloration may result. Mildew can be prevented by incorporating suitable preservatives in the oil finish. Some, though by no means all of the trade-brand oil finishes already contain preservatives. If so, the kind and amount should be stated on the label. Mere statement that the product itself is a preservative, however, is meaningless because the paint industry's use of that word may have no such significance.

If linseed oil or a commercial product not containing preservative is used, there are two ways of incorporating suitable preservative. One way is to buy one of the concentrated solutions of pentachlorophenol or other chlorinated phenols sold at lumber yards for preserving wood and to mix it with the linseed oil instead of adding turpentine or paint

thinner. If the directions on the preservative say that it is to be mixed with three times its volume of fuel oil for use as a wood preservative, it may be mixed one volume of concentrated preservative to three volumes of linseed oil for a linseed oil finish. The other way of accomplishing the purpose is to buy one of the water-repellent preservatives now sold at many lumber yards and some paint stores and apply it to the wood before the linseed oil finish is put on. In the second case most renewals of the finish can be done with the linseed oil alone, for the treatment with water-repellent preservative need not be repeated for 3 or 4 years.

The oil finishes may be further modified to advantage by incorporating a small amount of pigment in them. Usually a pigment of reddish-brown color is desired to simulate the color of the heartwood of redwood or redcedar. The pale color of any sapwood present in the lumber is thereby changed to resemble the heartwood more closely and such woods as pine or Douglas-fir are given a richer color. Moreover, better maintenance of color is achieved because the presence of the pigment tends to mask the gradual darkening in the color of the wood itself. If renewal of finish should be delayed until some boards become slightly grayed from weathering, the pigment helps to restore the desired color, provided the graying has not been allowed to go too far. Finally, presence of a little pigment usually adds appreciably to the durability of the finish. Of course, the amount of pigment must be small, well short of the point at which it would give a painted or even a stained appearance.

A number of the trade-brand oil finishes on the market contain pigments. Such products, of course, should be stirred thoroughly before use and should be stirred from time to time during use. Linseed oil or prepared oils without pigment can be pigmented just before use by adding a small proportion of burnt sienna ground in oil, which is sold at paint stores for tinting paints. The sienna-in-oil should first be stirred thoroughly with a little of the oil until it has the consistency of a thin paint and is free from lumps. It can then be stirred smoothly into the rest of the oil. About 1/2 pint of sienna-in-oil to a gallon of oil may be right but the exact proportions are best determined by trial by adding the color in small amounts at a time and applying the mixture to sample cuttings of the wood to be finished until the desired appearance is obtained.

Unusual natural finishes can be made in similar fashion by adding colors other than the reddish browns. Thus attractive finishes for redwood, redcedar, cypress, or knotty pine are sometimes made by adding just a little white, cream, or pale gray paint.

WOOD SEALER FINISH. Like the oil finish, the wood sealer finish is a penetrating finish that should not be permitted to build up on the surface into a glossy coating. Sealers do not penetrate wood so deeply as oils do. For that reason the sealers usually darken the wood less and give the surface more luster or glossiness than the oils do. The sealers, however, are less glossy than varnish finishes unless too much sealer is applied and the excess is not wiped off.

In composition, wood sealers are much like varnishes except that the sealers contain more thinner and less nonvolatile matter. Both are made as a rule by cooking resin and drying oil together in suitable proportions, incorporating driers, and thinning to proper consistency. Many kinds of resin, both natural and synthetic, may be used. The difference between a sealer and a varnish lies more in the method of application than in the composition. Wood sealer finish, like the oil finish, sinks into and saturates the wood surface without forming a continuous coating of appreciable thickness over it, as varnish finish does.

There are many wood sealer finishes sold at paint stores under trade-brand names. Unfortunately, the names and the directions given for use often fail to indicate clearly whether they are intended to be wood sealers or varnishes. In particular, the necessity of wiping off any excess material not absorbed by the surface is seldom properly emphasized in the directions. The uninformed user therefore may start out with a sealer finish and end up, after one or two renewals, with a varnish finish. On the other hand, those who wish to do so may buy a good spar varnish or marine spar varnish and obtain a sealer finish by using the varnish appropriately. Simply thin the varnish with about an equal volume of turpentine or other paint thinner and apply and maintain it as described for the oil finish.

Although most wood sealers are more resistant to mildew than the oils are, sealer finishes are more readily attacked by fungi than are good house paints. Wherever there may be lingering dampness it is advisable to have a preservative in the sealer finish. Some of the commercial products already contain preservative. Otherwise preservative may be incorporated in a sealer finish by either of the two methods suggested for oil finishes.

Some commercial wood sealers contain pigments for the same desirable purposes already described for oil finishes. The user may also add pigments to sealers lacking them by following the methods suggested for pigmenting oil finishes.

VARNISH FINISH. Unlike either oil finish or sealer finish, varnish makes a highly glossy coating of appreciable thickness covering the wood. Varnish may not darken the color of the wood to begin with much more than a sealer does but with the passage of time there may be more darkening caused by change in the varnish itself than would be the case with a wood sealer. It has long been customary to varnish front doors and other relatively small areas of exterior woodwork but the high gloss of varnish is seldom what is wanted for natural finish on large areas such as the siding of a house.

Nearly every paint store sells spar varnish of one trade brand or another. Marine spar varnish, intended for use on boats, is apt to be somewhat more durable than ordinary spar varnish. Varnish is applied by brushing or spraying. At least three coats are needed for new wood but

for renewal one coat at a time is sufficient. On new wood the first coat may be thinned moderately with turpentine or other paint thinner. Shellac must not be used for the first coat on exterior surfaces even over the knots in knotty pine. The succeeding coats are expected to stand out without penetrating the wood and, of course, none of the varnish is wiped off.

When renewing varnish finish it is difficult if not impossible to limit recoating to the more exposed portions of a sidewall where renewal is needed. The freshly applied varnish does not match in gloss and color the older varnish. Thus the protected areas must often be recoated even though they do not need renewal.

Where there is dampness at times varnish finishes need preservatives against mildew much like sealer finishes. Unless the varnish already contains a preservative it is advisable to apply a water-repellent preservative to the wood before starting to put on varnish. It is seldom practicable to add a concentrated preservative to a varnish because varnish cannot well stand much addition of thinner. Similarly it is not good practice to add pigments to varnish. If pigmentation is desired, it is best to apply a pigment oil stain to the wood first and then to varnish over it.

On the whole, experience with varnish finish on large areas of exterior woodwork such as siding has not proved satisfactory. Often the varnish finish develops milky, opaque patches where the coating has lost its adhesion to the wood without breaking open. Some varnishes craze or crack in an unsightly manner after which renewal of the finish is difficult. After two or three renewals the coating becomes too thick and begins to crack and scale badly. It then becomes necessary to remove all of the old varnish with varnish remover before the finish can be properly restored. Such removal is expensive and laborious.

Hardwoods

The methods of natural finishing described so far are suitable for all of the softwoods and for hardwoods with pores no larger than those in birch. Hardwoods with pores larger than those in birch, however, usually need special treatment for the pores after water-repellent preservative, if used, has been applied but before oil, sealer, or varnish is put on. The treatment for pores consists in application of a paste wood filler. "Natural" wood filler is a transparent material that does not alter the appearance of the pores. Colored wood fillers are also available that accentuate the pores, usually by making them dark brown or black, and thereby emphasize the grain pattern of the wood.

To apply paste wood filler, thin it with paint thinner to a consistency suitable for brushing and then apply it like paint, but brushing across the grain of the wood rather than with the grain. Then let the

coating stand a few minutes until the initial wet, glossy appearance changes to a dull aspect. Next wipe off the excess filler with clean rags, burlap, cotton waste, or other suitable wiping material. Wipe first across the grain to pack the pasty filler into the wood pores, then finally wipe lightly along the grain to avoid leaving slight streaks of excess filler crossing the wood grain. When the filler has dried -- at least overnight -- the finish coats of oil, sealer, or varnish may be applied.

For varnish finishes on hardwoods with large pores use of wood filler is necessary to avoid danger of premature failure of the finish. For wood sealer finishes the use of filler is strongly recommended, though it may not be essential. For oil finishes filler may be omitted if so desired.

Doors and windows

Doors and windows usually need more careful maintenance of protective finish than is necessary on siding. Retention of smooth surfaces, snug joints, and accurate shape and dimensions are essential for good appearances and proper functioning of doors and windows. Paneled doors have a number of joints that readily collect and retain rain water to the detriment of the wood unless protection by coatings is well maintained. Paint or trim enamel affords the most reliable means of keeping up the needed protection. For that reason careful consideration should be given to the choice of paint or trim enamel for the exterior surfaces of doors and windows even when natural finish is selected for the siding. Paint of a color matching that of the naturally finished siding may be used if desired.

But if natural finish is insisted upon for doors or windows it is probably best to apply a full varnish finish consisting of three or four coats because varnish gives better protection against wood weathering than oil or sealer finishes do. The varnish must, of course, be renewed as often as proves necessary and when the coating becomes too thick to avoid cracking, alligatoring, or bad scaling it must be stripped off with varnish remover before revarnishing. Such removal is less burdensome and expensive on the limited areas of doors and windows than it is on a large expanse of siding.

Varnish may last longer on doors and windows than it does on siding because the doors and windows, except their casings, are set back into the sidewalls, receive more protection from roof overhang than the lower courses of siding, may be sheltered by porch or entry roofs, and often are covered by storm sash or doors or fly screens for considerable portions of the year.

Windows and doors made of pine or other wood containing sapwood may well be treated with water-repellent preservative before they are installed. Such treatment helps to prevent blue stain in sapwood, which

causes discoloration even through paint coatings, and also affords some protection against decay at vulnerable points.

Rust stains

Woods that contain tannins, such as redwood, redcedar, oak, and chestnut, readily produce a black color when brought in contact with iron rust and a little moisture. Soluble compounds of iron react with tannin to form a blue-black compound related to some writing inks. Other extractives present in many woods may also form strongly colored compounds with iron. Exterior woodwork, therefore, should always be fastened in place with corrosion-resistant nails, screws, or other fastenings if it is to receive a natural finish. Such fastenings, in fact, are well worth while even when the wood is to be painted. Similarly hardware to be fastened to the exterior surfaces of wood should be resistant to corrosion, for the rain water dripping from rusty iron or even copper or brass can discolor wood and even paint. Well galvanized iron, cadmium-plated iron, aluminum, zinc, and stainless steel do not discolor wood. Corrosion-inhibitive paints will keep iron or steel hardware from discoloring wood, provided the protective coating is maintained adequately.

Clear finishing materials to be applied to wood must also be free from soluble compounds of iron. Shellac varnish or other spirit varnishes that have been kept in rusty metal containers or have otherwise come in contact with iron rust will blacken woods that contain tannin or other extractives that react with iron. Even oil-soluble water-repellent preservatives, oil finishes, and sealer finishes have been known to produce black specks on redwood or oak woodwork when the material was applied from rusty paint pails. Similarly exterior woodwork that has been smoothed with steel wool may develop black specks after the first rain from particles of steel left in the surface of the wood.

Changing from natural to paint finish

It is not a good plan to start out with natural finish on a new house as an experiment with the idea of changing to paint finish later if the natural finish fails to please. It is much better to visit houses that have been kept in natural and in paint finishes for a few years to learn what experience teaches and then to choose finally before the house is completed. For reliable painting the first or priming coat applied on the bare wood is more important than any coat that can be applied subsequently. The priming paint for a paint job should be one designed specifically for that purpose. None of the natural finishes complies with the requirements of a good priming for paint coatings.

If, however, there are good reasons for painting a house that has previously had a natural finish, the change can be made reasonably satisfactorily, provided suitable precautions are taken. If the natural finish was of the varnish type or a sealer that has been allowed to accumulate

until it becomes essentially a coating, the wood surfaces should first be stripped of all clear material with varnish remover. Any wax the remover left behind should then be washed off with paint thinner or with soap and water. Next, light sandpapering of the surfaces is usually advisable. Painting can then be done just as on a new house. Removal of all clear finishing material is most necessary on the protected areas of the house, even though the natural finish may remain in best condition there.

If the natural finish was of the oil type or of the sealer type and remains strictly within the wood surface, it may be practicable to apply paint without first removing the clear material. In that case, however, it is wise to let at least a year elapse after the last coat of clear material was put on before attempting to apply paint. If after that time some of the protected areas remain more or less glossy, the surface should be sandpapered until the glossy material has been removed. The first coat of paint applied should then be a priming paint suitable for use under the paint chosen for finish coats and applied just as it would be on new wood.

Natural finishes for major areas of house exteriors are a relatively new development with which many painters have as yet had only limited experience. This report has therefore dealt at some length with the various misunderstandings and difficulties that have come up in the Forest Products Laboratory's consultations with house owners, architects, builders, painters, and others. But when the requirements and limitations of the natural finishes are properly considered in advance and the necessary precautions have been taken, many owners of houses have found them practicable and have been well pleased with them.

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